



Modelling of rainfall maxima at different durations using max-stable processes

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The multivariate extreme value distribution (MEVD) has been used to model the dependence of rainfall block maxima at different temporal resolutions, as a means of estimating intensity-duration-frequency (IDF) curves for engineering applications. It is characterized by max-stability, which assumes that under proper renormalization, the rainfall block maxima at different temporal resolutions are extreme value distributed and the degree of their dependence remains invariant to the severity of the event. Due to these properties, and contrary to other commonly used approaches, MEVD allows for more conservative return level estimates at those durations used for model fitting. Max-stable processes are continuous extensions of MEVD, which are more flexible, and allow for extrapolation to temporal resolutions beyond those used for model fitting. Here we: 1) propose using max-stable processes to model rainfall block maxima, 2) apply the Brown-Resnick, Schlather and extremal-t models to hourly rainfall data, and 3) compare the obtained results to traditional approaches for IDF estimation. We discuss advantages and limitations regarding the use of max-stable processes in IDF estimation, and their potential use in hydrologic practice.